Study on Improvement of Interest Deduction Rule for Multinational Corporations

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Introduction

A multinational corporation intricately organizes and operates the governance and transaction structure of its group of companies and subsidiaries in multiple countries. It can be considered as a group of companies with various subsidiaries. There are diverse reasons why subsidiaries of multinational corporations are operated under complex structures, but the number one reason is to reduce taxes internationally.

Tax strategy of a multinational corporation consists of methods to take advantage of vulnerabilities in taxation laws and tax treaties that differ from country to country. While this strategy is most often in compliance with the taxation laws and treaties in the relevant countries, they search for and take advantage of loopholes that may contradict the original purpose of the law and be outside society’s moral standards.

Recently, major governments and international organizations including the OECD and G20 have suggested supplementing weak international tax systems to reduce the likelihood of exploitation by these multinational corporations seeking to avoid taxes. A typical example is the Base Erosion and Profit Shifting (BEPS) prevention project of OECD/G20. Upon various tax avoidance strategies, their interest is on the strategy based on debt contract and interest payment between subsidiaries. Various countries employ a system to limit the deduction for interest costs to prevent such tax avoidance.

First, let us show the reason why a multinational corporation can reduce taxes by debt contract and interest payment between subsidiaries. A company
raises funds through borrowings (receiving a loan or issuing a bond) or equity (investment from shareholders). If it receives borrowing, it pays interest to the creditor; and if it raises funds by equity, it pays dividends to shareholders. Many countries consider interest payments as a business expense and deduct them from their corporate tax liability. Generally, dividends are excluded from cost deduction. Therefore, companies prefer borrowing to equity investment so their corporate structure can deduct interest payments and reduce their tax liability.

However, an individual company cannot extend its borrowings infinitely no matter how it may reduce taxes because of solvency issues. Therefore, it will be important to manage financial instability by raising long-term and stable funds, such as equity investment. One of the solutions to raising stable funds is to borrow from related parties (major shareholders or affiliates).

A multinational corporation has affiliate companies all over the world with significantly different CIT (corporate income tax) rates.\(^1\) It will have an affiliate in a country with a relatively higher tax rate obtain long-term borrowings from another affiliate with a lower tax rate and pay interest to reduce its tax burden internationally. If the loan agreement with the affiliate with the lower tax rate sets the interest rate higher than the market interest rate, the corporation may transfer more profits to the corresponding country. Furthermore, the corporation may use the combined financial product of liability/equity for the agreement, enjoy an interest deduction for paying affiliate (with higher tax rate) and exclude the interest income from taxable income of the receiving affiliate (with a lower tax rate) (exclusion from gross income) to internationally remove the tax burden on transferred income through the interest payment.

Furthermore, it is known that, for some multinational corporations, a parent company obtain loans from affiliates with a lower tax rate and buy their shares to prevent a decrease in share value from deferring the payment to the affiliate with a lower tax rate (tax deferred), reducing the parent company’s profits and decreasing the dividends to shareholders. That is, they combine the

\(^1\) For example, nominal tax rate of maximum bracket under the US federal tax law is 35% and that of Ireland is 12.5%. Cayman Islands does not impose corporate income taxes, Nominal corporate income tax rate of Korea is about 24%.
loan from affiliates with the lower tax rate and self-tender and prevent a decrease in share value through deferred tax, one of the major methods for tax avoidance. In summary, a multinational corporation can avoid taxes under different tax rates of different countries by combining various tax avoidance strategies, including deduction of interest expenses, strategic setting of interest rate (transfer price), transaction of combined financial products and deferring taxes in the residing country.

Korea’s current system to prevent interest deduction, that is, “Thin Capitalization Rule,” sets the limitation on borrowing to equity ratio (2x). Korea does not recognize interest expenses on borrowings exceeding such limit but considers it as a dividend for calculation of taxable income. Such thin capitalization rule may be considered strong since the limit is relatively low and interest expenses for exceeding borrowings are considered as dividends. However, it is somewhat remote from the direction taken by international organizations including the OECD. Recent discussions do not include borrowing to equity, but concentrate on a limit of interest to income, which is represented by Earnings Before Interest, Tax, Depreciation and Amortization (EBITDA).

This report analyzes and compares the systematic design and effect of debt ratio standard and interest cost ratio standard for operation of the thin capitalization rule to restrict interest deduction of multinational corporations. For such purpose, we will examine the status of the thin capitalization rule in Korea and major countries and discussions within international organizations, such as the OECD. We will combine actual data and theoretical grounds to analyze the effects of the thin capitalization rule.

Now, we will examine the existing studies of tax avoidance and interest deduction strategies of multinational corporations. Basically, interest deduction strategies of multinational corporations have a close relationship with financial structure. Therefore, a study on interest deduction strategies should include financial structures of multinational corporations along with legal and institutional studies. However, there has been no Korean study to combine financial structure, tax avoidance, interest deduction strategies, and interest deduction system of multinational corporations.

Buettner et al. (2012, JPub) examined the panel data of German multinational corporations and their affiliates to analyze the effect of thin
capitalization rules on financial structures of affiliates in foreign countries. As a result, the thin capitalization rules of countries, in which the affiliates are located, contribute to a decrease in debt contract among affiliates (liability from related parties) and to an increase in external debt contract.

Buettner and Wamser (2013, NTJ) shows that multinational corporations with affiliates having a lower tax rate are involved in more internal debt contract between affiliates. The study also found that the wider the difference between tax rates of the residing country and source country, the greater the number of debt contract between affiliates. However, they also mention that ultimately such income transfer does not decrease the total amount of tax. It is because income transfer to affiliates with lower tax rate increases the retained income of such affiliates (that is, Controlled Foreign Corporation) and according to Germany’s CFC regulations, it is considered a dividend and increases the taxable income to offset the tax reduction effect from interest deduction and income transfer.

Desai et al. (2004, JF) is the first study to analyze the actual relationship between financial structure and tax rates of affiliates of multinational corporations. As a result, when the tax rate of the source country increases by 10%, the liability to asset ratio increases by about 3%. That is, as the tax rate increases, the liability ratio also rises. They also found that debt contract between affiliates reacts more sensitively to tax rate than external debt contract. Especially, affiliates in countries with underdeveloped capital markets or without proper protection for creditors use relatively fewer external debt contract. They account for more active use of the internal capital market to overcome the constraints of an external capital market.

Desai and Dharmapala (2015) summarized the discussion of interest deduction systems for multinational corporations among international organizations, policy experts and researchers and discussed institutional characteristics, limitations and related political issues. They also examined the tracing rule, earnings stripping rule, formula apportionment and thin capitalization rule as regulations of interest deduction prevention for multinational corporations and also discussed comprehensive business income tax and allowance for corporate capital.

This report consists of the following chapters. First, Chapter II shows
the status of systems to limit interest deduction of major countries including Germany, Japan and the United States as well as Korea. In addition, major issues of the OECD’s BEPS prevention project will also be discussed. Chapter III analyzes financial structures and effective tax rates of multinational corporations. Lastly, Chapter IV will conclude by a summary and implications.
Comparative Analysis for
Interest Cost Restriction Regulation

This chapter will show examples of how after-tax profits change according to various regulations on interest deduction. Our comparison selected institutional alternatives, suggested by international organizations, policy experts and researchers to prevent multinational corporations from abusing interest deductions, or systems under actual application, rather than a specific form of restriction on interest deduction. This chapter will include the tracing rule, earnings stripping rule, formula apportionment and thin capitalization rule.\(^2\)

3-Country Model

Let us assume there are Companies A, B and C in Countries A, B and C, respectively. Company A and Company B are trying to acquire Company C through borrowings (or issuing corporate bonds). They need 100 to acquire Company C. Company A and Company B plan to raise funds from the international capital market and the interest rate is \(r\). If the international capital market is competitive, market interest rate \(r\) is not affected by investment decisions of individual companies. The total capital of 100 is raised with the

\(^2\) This chapter is based on institutional strategies suggested by Desai and Dharmapala (2015) to take action against abuse of interest deduction
market interest rate of \( r \), so pretax (before deduction) interest expense is expressed as \( 100 \times r = R \).

Now, we assume that corporate income tax rate of Country A is \( t_A \), and for Country B and Country C, \( t_B \) and \( t_C \), respectively. Let us assume that Company A’s profit is 20; asset is 200; debt is 150; and equity investment is 50. Likewise, Company B’s profit is 20; its asset is 200; debt is 100; and equity investment is 100. That is, Companies A and B obtain the same level of profit and assets but with different financial structures as distinguished by borrowings and equity. The acquisition target Company C’s profit is 10 and its asset is 100. Assumptions are summarized in the following table.

If there is no restriction on interest deduction, interest expenses of each company will be deducted from pretax income. If all interest expenses are deducted from taxable income, after-tax interest expenses will decrease proportionately to the marginal tax rate of the company. After-tax expenses of Company A become \( R(1 - t_A) = R_A^* \) and those of Company B are \( R(1 - t_B) = R_B^* \). We can see that the higher the marginal tax rate, the more after-tax interest expense decreases.

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Now, assume that there exists a system to limit interest deduction. After-tax interest expense of a company will be determined by specific conditions of regulation on interest deduction.

As mentioned above, our comparison selects institutional alternatives, suggested by international organizations, policy experts and researchers to prevent multinational corporations from abusing interest deductions or systems under actual application, rather than a specific form of restriction on interest
deduction. We will include the tracing rule, earnings stripping rule, formula apportionment and thin capitalization rule under examination. Most of the member states of the European Union, including Germany, select the earnings stripping rule. Korea operates with the thin capitalization rule. Although there is no history of actual application of the tracing rule and formula apportionment, they are examined because several existing studies have suggested them as institutional solutions to prevent abuse of interest deductions.

### Tracing Rule

Let us assume that a country selects the tracing rule system to prevent the abuse of interest deduction. Under the tracing rule system, the flow of investment to acquire Company C is identified and corresponding interest expense are deducted only from income generated from Country C. That is, no interest deduction is applied in Country A or Country B, where borrowing companies reside. As a result, after-tax expense of Company A and Company B after acquisition of Company C is \( R(1-t_c) = R_c^* \). That is, after-tax expense of competing companies for acquisition of Company C becomes identical. Furthermore, the taxation systems of residing countries (Country A and Country B) do not influence after-tax expenses. Such taxation system has an institutional advantage to have a neutral influence on competition between companies.

However, in practice, it will be highly difficult to identify the total international flow of investment. Therefore, the tracing rule system has not yet been applied in practice despite its institutional advantage.

### Earnings Stripping Rule

Earnings stripping rule system sets the limit to ratio of interest costs
to earnings (interest/earnings ratio) and interest expenses exceeding the limit are not recognized as costs. However, since corporate income fluctuates more than equity investment, a company may not enjoy interest deduction due to low income from temporary earning shock. The Safe Harbor Rule is to prevent such circumstances. According to the Safe Harbor Rule, if the debt to equity investment ratio (borrowing/equity ratio) is below a certain limit, no limit on interest to income ratio is applied. Under the earnings stripping rule, interest deduction is determined by how low the interest to income ratio is set.

For example, assume that the interest rate of an international capital market is 5% (that is, total interest expense is 5) and the limit of interest to income ratio is 30%. The limit of interest deduction becomes 6 and exceeds total interest expense. Therefore, all interest expenses are deducted within the range of interest to income ratio. After-tax interest expenses are \( R^*_A \) and \( R^*_B \), respectively.

Now, assume that the market interest rate does not change but the interest to income ratio increases to 20%. Since the limit has decreased, interest expenses only up to 4 will be deducted. Therefore, only 4 out of 5 will be deducted and the remaining amount is not deductible. The after-tax interest expense of Company A becomes \( 4(1 - t_A) + 1 > R^*_A \). Similarly, the after-tax interest expense of Company B is \( 4(1 - t_B) + 1 > R^*_B \). After-tax interest expenses increase by the non-deductible amount as the limit decreases. In addition, after-tax interest expenses of Company A and B are influenced by the tax rate of the residing country (that is, \( t_A \) and \( t_B \), respectively).

### 4 Formula Apportionment

We will examine a case where the formula appointment system is applied to prevent the misuse of interest deduction of multinational corporations. The formula apportionment system allocates interest expenses proportionately to the size of assets in each country and applies deductions by country. An alternative method is to allocate the expenses proportionately to the size of income from each country. This study will examine allocations based on the asset size.
In the example mentioned above, the total assets of Company A and Company B after acquisition of Company C become 300, respectively. Equity ratio in Country A or Country B is 2/3 and in Country C, 1/3. In a case where Company A acquires Company C, 2/3 of pretax interest expense ($R$) is allocated to Country A; and 1/3 will be allocated to Country C. Likewise, 2/3 of interest expenses of Company B will be allocated to Country B; and the remaining 1/3 will be allocated to Country C.

As a result, after-tax interest expense of Company A for acquisition of Company C is $\frac{2}{3} R(1-t_A) + \frac{1}{3} R(1-t_C)$ and that of Company B is $\frac{2}{3} R(1-t_B) + \frac{1}{3} R(1-t_C)$. If $t_A > t_C$ and $t_B > t_C$, after-tax interest expense of each company is higher than $R_A^*$ and $R_B^*$, respectively. That is, when interest expenses are deducted in countries with a lower corporate income tax rate (in this case, Country C), after-tax interest expenses increase to the corresponding amount.

5 Thin Capitalization Rule

Lastly, let us examine the thin capitalization rule, which is applied in Korea. When the thin capitalization rule is applied, the limit is set based on the borrowing/equity ratio and interest costs for borrowings exceeding such limit cannot be deducted.

Borrowings may be defined by those from related parties or all borrowings. Furthermore, borrowings exceeding the limit are not only excluded from the deductible amount but also may be considered as dividends to impose more taxes. Assuming no limitation on borrowings from related parties or dividend rule, the borrowing to equity ratio of Company A in the 3-country example above is 3 and that of Company B is 1. If the limit on borrowing to equity ratio is 2x, that is, if interest expenses are not deductible when the borrowing exceeds 2x the equity, interest expenses of Company A for acquisition of Company C cannot be deducted. Therefore, after-tax interest expense is the same as pre-tax interest expense, $R$. On the contrary, all interest expenses of
Company B for the acquisition are deductible and the after-tax interest expense is $R_B^*$.

6 Implications

In summary, when a multinational corporation raises funds through borrowing, financing cost (that is, after-tax interest expenses) is influenced by the marginal tax rate and interest deduction regulations of the residing country. The higher the tax rate of the residing country, the more after-tax interest expenses decrease (that is, a higher tax rate means higher income tax deduction rate). Strict deduction regulations (that is, limits on deduction of interest to third parties other than related parties or lower limit) leads to an increase in after-tax interest expense. In addition, after-tax interest expense is supposed to change according to the financial structure of an individual company. Especially, rules for deduction limit determine the after-tax interest expenses of an individual company. Furthermore, such change in expenses may have influence on competition among multinational corporations.
Analysis of Financial Structure & Effective Tax Rate of Multinational Corporations

The previous chapter showed various methods to limit expense deductions (exclusion from deductible expenses) when interest expenses of multinational corporation are deducted from taxable income. Interest deduction regulations of major countries can be divided into two categories: whether the regulation standard chooses stock ratio or flow ratio. One of the examples of stock ratio is debt to equity investment ratio, which is selected in Korea’s thin capitalization rule. That of flow ratio is interest to EBITDA ratio, which is selected by the EU countries.

In fact, only recently have major taxation authorities selected interest to EBITDA ratio as a standard for interest deduction regulation on multinational corporations. Germany started to use the flow ratio to limit interest deduction in 2008, and Japan in 2013. Before such institutional change, most countries have used a stock ratio for interest deduction regulations.

Since every country has different standards for interest deduction regulations and the difference has occurred relatively recently, it is indeed meaningful to analyze the actual relationship between each standard and tax burden of multinational corporations. For example, if the flow ratio shows a more statistically significant relationship with effective tax rate, we may suggest it as a policy to limit interest deduction and to change the effective tax rate of multinational corporations.

This chapter analyzes the actual relationship between financial structure and effective tax rate of multinational corporations. Specifically, our study limits
the scope to US-based multinational corporations to examine the relationship between interest expenses/borrowings and effective tax rate. Based on the analysis, we will discuss implications of interest deduction system for multinational corporations.

**Hypothesis Setting**

Generally speaking, a multinational corporation is not a single company but a group of multiple affiliates doing business in multiple countries. In addition, affiliates of such multinational corporation are connected with complicated governance and financial structure. There are many reasons why their governance and financial structures are so complex and one of the major reasons is tax reduction.

Most countries deduct all or a significant part of interest expenses from taxable income when imposing corporate income tax. They also set the limit of deductible interest expenses based on debt-to-equity ratio or interest to EBITDA ratio. If tax rates are different in each country of affiliates, the corporation may adjust the financial structure of its affiliates, use an interest deduction system and reduce the tax burden of the company as a whole.

**A. Without Safe Harbor Regulation**

Assume the following situation to understand the international tax strategies using the different CIT rates in each country and interest deduction system. A multinational corporation has two affiliates, Affiliate H and Affiliate L, in two countries, Country H and L, respectively. The corporate income tax rate of Country H is 40% and that of Country L is 10%. The withholding tax rate on interest income based on a tax treaty between the two countries is 0%. Country H allows interest deduction based on interest to EBITDA ratio of up to 50%. That is, interest expenses exceeding 50% of EBITDA may not be deducted from taxable income. Affiliate H’s EBITDA is 100 and that of Affiliate L is 0. If the corporation does not use the interest deduction system, the corporate income tax of Affiliate H is 40 and that of Affiliate L is 0; and the corporation
should pay 40 as total corporate income tax.

Assume that Affiliate H borrows from Affiliate L and pays interest. If Affiliate H pays Affiliate L 10 as an interest, interest to EBITDA ratio becomes 10%, which is below the limit. Therefore, interest expense of 10 will be deducted from Affiliate H’s taxable income and Affiliate H will pay the corporate income tax of 36, which is 40% of 90. Since withholding tax on interest income based on tax treaty is 0%, no such tax is applied. Affiliate L will pay 1 (10%) as corporate income tax for interest income of 10. In this case, total corporate income tax decreases by 3 to 37 from 40 without any debt contract structure. The decreased value is identical to the multiplication of the interest (10) by the difference in the two countries’ tax rates (30%). Within the interest deduction limit, since Affiliate H pays interest to Affiliate L, the overall tax burden decreases. Especially, if Affiliate H pays 50 for interest, the incomes of Affiliate H and L become 50, respectively, and corporate income tax becomes 20 and 5, respectively, for a total tax expense of 25.

If Affiliate H pays 60 as an interest to Affiliate L, now interest to EBITDA ratio is 60% to exceed the limit of 50%. Since Country H excludes the exceeding 10% from interest deduction, only 50 is deducted for Affiliate H and taxable income becomes 50. Affiliate L receives 60 as interest income and total income is 60 as a result. Corporate income taxes for two affiliates are 20 and 6, respectively, and the sum is 26. It is increased by 1 from 25 when the interest payment is 50. The increased value is identical to the multiplication of the non-deductible interest (10) by the tax rate of Country L (10%) for interest income. When the interest expense exceeds the deduction limit, the tax burden may increase since Affiliate H pays more interest to Affiliate L. Since the increase in tax burden is proportional to the tax rate of Country L, if the tax rate is 0%, the total tax may remain at 25 even when the interest payment exceeds the deduction limit.

Therefore, it can be expected that the more the interest expense is paid between affiliates the more the overall effective CIT rate decreases. Since interest expenses exceeding the deduction limit cannot be deducted, to reduce taxes, multinational corporations are expected to constitute its debt contract within the deduction limit. Based on the discussion above, we present the following hypothesis.
Hypothesis 1. When the interest to EBITDA ratio of a multinational corporation increases, the effective tax rate decreases.

B. With Safe Harbor Regulation

Up to this point, we excluded the Safe Harbor Rule in assumptions of Country H’s interest deduction system for multinational corporations. The Safe Harbor Rule allows deduction of all interest expenses with the debt-to-equity (investment) ratio under a certain level, for example, 150% in the US. Therefore, if a multinational corporation complies with this rule, all interest expenses of affiliates exceeding the interest deduction limit are deducted and the general corporate income tax burden will be reduced as a result. On the other hand, if it does not satisfy the conditions of the Safe Harbor Rule, it can reduce its tax burden only when it pays interest expenses under the interest deduction limit. If interest expenses exceed the deduction limit, tax is not reduced. It can be expected that the effective tax burden increases when a multinational corporation does not satisfy the conditions of the Safe Harbor Rule, in comparison to ones that do. However, not satisfying the conditions of the Safe Harbor Rule, that is, a higher debt ratio, means more interest payments which may result in a greater deduction from taxable income. In light of this fact, the effective tax rate may decrease as a result. Though a multinational corporation does not satisfy the conditions of the Safe Harbor Rule, its interest expenses are still deducted from taxable income and the effective tax rate will decrease as long as it does not exceed the interest deduction limit.

Considering the overall result of contradicting effects, we suggest the following hypothesis.

Hypothesis 2. Generally, when the debt-to-equity ratio exceeds the Safe Harbor Rule there is an uncertain influence on effective tax rate. However, if a multinational corporation constitutes its debt contract without exceeding the interest deduction limit and then exceeds the Safe Harbor Rule, the effective tax rate decreases.
It is also uncertain how the debt-to-equity ratio affects the effective tax rate and if a multinational corporation satisfies the conditions of the Safe Harbor Rule. If interest rates of multiple debt contracts are different, the relationship between borrowing and interest payment is uncertain. As a result, the influence of borrowing on taxable income and effective tax rate becomes unclear.

2 Analysis Method

A. Scenario

This study analyzes the effect of interest to EBITDA ratio and debt-to-equity on the effective tax rate. There will be two variables for effective tax rate; one is the cash effective tax rate (based on actual tax payment) and the effective tax rate based on general accounting standards.\(^4\)

Each effective tax rate is assumed as a dependent variable, and major independent variables include interest rate, debt ratio and dummy for exceeding debt limit etc. Additionally, control variables include revenue, total assets, ratio of property, plant and equipment to total assets, ratio of intangible assets to total assets and ratio of research and development costs to total assets.\(^5\)

According to the definition of effective tax rate and scope of control variables, this study analyzes four scenarios. The first case assumes cash ETR as a dependent variable and ratio of interest costs, debt ratio, dummy for exceeding debt limit, revenue and total assets as independent variables. The second case adds the ratio of property, plant and equipment to total assets, ratio of intangible assets to total assets, and ratio of research and development costs to total assets as independent variables to the first case. Case 3 sets the effective tax rate from accounting standards as a dependent variable and ratio of interest costs, debt ratio, dummy for exceeding debt limit, revenue, total

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4) Variable for typical effective tax rate was first introduced by Dyreng et al. (2008, AR) and recently has been used as an index to measure the tendency for tax avoidance in many studies.

5) Gallemore and Labro (2015, JAE) considered named control variables as they empirically analyzed the effect of quality of internal information on cash ETR.
assets as independent variables. The last scenario adds the ratio of property, plant and equipment to total assets, ratio of intangible assets to total assets, and ratio of research and development costs to total assets as independent variable to Case 3.

B. Variables

Generally, an audit report consists of financial statements and footnotes. Financial statements include Income Statement (IS), Balance Sheet (BS) and Cash Flow Statement (CF). Each variable is defined based on company i and year t. The following variables are defined, based on financial statements by multinational corporation i in year t.

Two types of effective tax rates (ETR) are assumed for dependent variables. First of all, the cash effective tax rate (Cash ETR) variable is the annual sum of tax paid in cash divided by pre-tax profit, deducted by special items. That is, it is defined by “Cash Taxes Paid / (Pre-tax Income - Special Items)” and calculated by “Cash Taxes Paid” of the CF, “Pretax Income” and special items in the IS and the unit is converted to percent (%). If pretax profit is too small or has negative value (loss based on pretax profit), the value of the cash effective tax rate variable may be too big or below zero. Since the variable represents a tax rate, it seems appropriate to limit the range between 0 and 100; and an effective tax rate below 0 or exceeding 100 seems exceptional. Therefore, we have winsorized the cash effective tax rate between 0 and 100 to control such outliers. That is, all values below zero are considered as 0, and those exceeding 100 are considered as 100. Such definition of the cash effective tax rate variable was first introduced in Dyreng et al. (2008, AR) and used to measure the tendency of tax avoidance in further studies.

Another effective tax rate variable is based on accounting standards (GAAP ETR). GAAP ETR is based on corporate income tax expenses in the IS divided by pretax income and the unit is percent (%). As we defined the Cash ETR, it is winsorized between 0 and 100.

The ratio of interest costs to EBITDA (InterestEBITDA), one of the major independent variables, is calculated by dividing interest costs in the IS by EBITDA where the unit is percent (%). However, interest payment between
affiliates may be offset in consolidated financial statements. In this case, interest costs in the IS will be smaller than the actual interest payment of a certain corporation. ExcessIE is a dummy variable to indicate whether the interest to EBITDA ratio exceeds 50% (if yes, 1; and if not, 0).

Debt-to-equity ratio (DebtEquity) is “Total Debt” divided by “Total Equity” of the BS, and the unit is percent. “Total Debt” in the BS includes short- and long-term borrowings and financial leases. However, it does not include trade payables or account payables, which can occur during business operation. “Total Equity” consists of paid capital (shareholder investment) along with retained earnings and other capital surplus.

A company’s liabilities may include trade payable or account payable, and is not limited to borrowings. Such liability is called “Total Liabilities” in the BS. Liability to equity (LiabEquity) is defined by ratio of Total Liabilities to Total Equity and the unit is percent (%). ExcessLE is a dummy variable with the value of 1 when LiabEquity exceeds 150% but is otherwise 0.

Other control variables are as follows. Revenue is “Total Revenue” in the IS and the unit is million US dollars. Similarly, EBITDA is in the IS and the unit is million US dollars. Total asset is defined by “Total Assets, Reported” in the BS, and the unit is also million US dollars.

Property, plant and equipment are defined by “Property/Plant/Equipment, Total Net” of the BS. Intangible assets are based on “Intangibles, Net” of the BS. Research and development cost is defined by “Research And Development” in the IS. These three variables are divided by total assets, converted to percentage value (%), and marked as PPEAsset, IntangAsset and RnDAsset, respectively.

3 Data

A. Company Data for Analysis

Data was collected from consolidated financial statements of multinational corporations based in the US. The target of our analysis is limited to Standard & Poor’s 500(S&P 500) companies. S&P 500 companies consist
of those with large market capitalization and are representative of the industries listed in NASDAQ. With some exceptions, these companies are multinational companies with affiliates all over the world. The United States is the biggest capital exporter in the world. It can be shown by the amount of foreign direct investment in Korea. Therefore, it is meaningful to understand the financial structure of US multinational corporations including major affiliates, and the relationship between such financial structures and effective tax rates.

Financial statements of S&P 500 companies are extracted from Thomson Reuters Eikon. As of July 2016, data for 498 out of the S&P 500 companies were available in Eikon. We excluded banks and real estate investment trust (REIT) companies from our analysis because the banking industry shows a larger scale of liability and interest costs in comparison to other industries and 17 companies fall under this category.6) REIT companies are excluded because they do not pay corporate income taxes and there are only 25 companies.7) There are 456 remaining companies.

The analysis period of data is the 10 years from 2006 to 2015. The total number of observations of annual data of 456 companies (company-year) is 4,444. The EBITDA’s of 290 company-year data are omitted but the number of observations of variables related to EBITDA is 4,154.

B. Descriptive Statistics

<Table III-1> shows descriptive statistics of variables. Let us show the performance of S&P 500 companies for the last 10 years. On average, annual revenue is 19,689.35 million dollars, EBITDA, 3,517.04 million dollars, and total assets, 39,723.07 million dollars. Estimating the size in Korean won by assuming the exchange rate at 1,100 won/dollar, total revenue is about 21.65 trillion won, EBITDA, 3.87 trillion won, and total assets 43.7 trillion won.

---

6) Banks excluded from the data are as follows: FITB.O, USB, C, BBT, BAC, ZION.O, JPM, WFC, CFG, KEY, RF, HBN.O, MTB, PBCT.O, CMA, PNC, and STI

7) Real estate trust companies excluded from the data are as follows: HCP, VNO, AIV, PLD, AVB, PSA, EQIX.O, HCN, VTR, MAC, EXR, BXP, GGP, SPG, ESS, KIM, AMT, UDR, FRT, EQR, DLR, O, WY, SLG, HST
Study on Improvement of Interest Deduction Rule for Multinational Corporations

On average, the cash effective tax rate was 24.96%. It is relatively low while the nominal tax rate of the maximum income bracket under US federal corporate income tax law (over 18.33 million dollars) is 35%. It is because the effective tax rate calculated from consolidated financial statements is based on taxes paid in various countries including the United States. It may be also because tax rates of other countries are relatively lower than that of the US. Furthermore, the effective tax rate may have decreased since the multinational corporations have used various deduction systems and tax strategies. Meanwhile the winsorized cash effective tax rate (Winsorized Cash ETR) was 24.17%, on average. The effective tax rate based on general accounting standards was 29.21%, on average. The winsorized effective tax rate based on general

<table>
<thead>
<tr>
<th>Variable</th>
<th>Observation</th>
<th>Average</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>CashETR</td>
<td>4,444</td>
<td>24.96</td>
<td>297.41</td>
<td>-5,714.29</td>
<td>17,233.33</td>
</tr>
<tr>
<td>CashETRW</td>
<td>4,444</td>
<td>24.17</td>
<td>20.14</td>
<td>0.00</td>
<td>100.00</td>
</tr>
<tr>
<td>GaapETR</td>
<td>4,444</td>
<td>29.21</td>
<td>120.47</td>
<td>-1,113.07</td>
<td>6,575.00</td>
</tr>
<tr>
<td>GaapETRW</td>
<td>4,444</td>
<td>27.66</td>
<td>14.60</td>
<td>0.00</td>
<td>100.00</td>
</tr>
<tr>
<td>InterestEBITDA</td>
<td>4,154</td>
<td>10.80</td>
<td>60.04</td>
<td>-1,934.58</td>
<td>2,722.85</td>
</tr>
<tr>
<td>ExcessLE</td>
<td>4,154</td>
<td>0.02</td>
<td>0.14</td>
<td>0.00</td>
<td>1.00</td>
</tr>
<tr>
<td>DebtEquity</td>
<td>4,444</td>
<td>74.25</td>
<td>1,178.28</td>
<td>-38,808.64</td>
<td>26,233.33</td>
</tr>
<tr>
<td>LiabEquity</td>
<td>4,444</td>
<td>231.49</td>
<td>2,388.27</td>
<td>-68,967.90</td>
<td>99,020.51</td>
</tr>
<tr>
<td>ExcessLE</td>
<td>4,444</td>
<td>0.49</td>
<td>0.50</td>
<td>0.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Revenue</td>
<td>4,444</td>
<td>19,689.35</td>
<td>38,600.54</td>
<td>-6,840.00</td>
<td>485,651.00</td>
</tr>
<tr>
<td>EBITDA</td>
<td>4,154</td>
<td>3,517.04</td>
<td>6,523.73</td>
<td>-9,637.00</td>
<td>81,730.00</td>
</tr>
<tr>
<td>Asset</td>
<td>4,444</td>
<td>39,723.07</td>
<td>98,733.62</td>
<td>281.85</td>
<td>1,121,190.00</td>
</tr>
<tr>
<td>PPEAsset</td>
<td>4,356</td>
<td>22.54</td>
<td>22.75</td>
<td>-33.97</td>
<td>142.62</td>
</tr>
<tr>
<td>IntangAsset</td>
<td>3,568</td>
<td>8.44</td>
<td>9.61</td>
<td>-0.59</td>
<td>58.93</td>
</tr>
<tr>
<td>RnDAsset</td>
<td>1,549</td>
<td>5.77</td>
<td>6.07</td>
<td>0.00</td>
<td>86.33</td>
</tr>
</tbody>
</table>
accounting standards was 27.66%, on average. The effective tax rate based on general accounting standards was higher than the cash effective tax rate, but still lower than the nominal corporate income tax rate of the United States.

On average, interest to EBITDA ratio (InterestEBITDA) was 10.80%. About 2% out of a total of 4,154 observations has the ratio of interest costs exceeding the limit, 50%, with interest from exceeding amount not deducted. That is, 98% of companies could obtain interest deduction. Such a conclusion conforms to our expectation that for a multinational corporation to reduce taxes, it will not exceed the deduction limit when in composes a debt contract. For Hypothesis 2, since most multinational corporations construct their debt contract within the deduction limit, their effective tax rates are expected to decrease when they exceed the ratio of Safe Harbor Rule.

On average, the debt-to-equity ratio was 74.25%, and the liability ratio was 241.49%. Among 4,444 observations, 49% exceeded the borrowing limit of 150% under the Safe Harbor Rule. On the other hand, 51% of the observations maintained their liability ratio below the 150% limit specified in the Safe Harbor Rule, and regardless of the interest to EBITDA ratio, their interest expenses could be deducted.

<Table III-2> shows the distribution of major variables. For example, if we examine the performance of the top 1% with regards to each variable, that is, the column “99%” in <Table III-2>, they obtain at least 168,884 million dollars and 35,330 million dollars of total revenue and EBITDA, respectively, and hold 620,244 million dollars in total assets. Estimating the size in Korean won by assuming the exchange rate at 1,100 won/dollar, total revenue is about 185.77 trillion won, EBITDA, 38.86 trillion won, and total assets, 682.27 trillion won.

<Table III-2> also shows the distribution Cash ETR and effective tax rate from accounting standards. On average, the lowest 25% of cash effective tax rate is about 8.63% and top 25% is about 33.81%. The median is 23.60%. The winsorized cash effective tax rates also show identical quartiles. The lowest 25% of effective tax rate from accounting standards is 21.22%, while the top 25% is 36.20%. The median is 30.56%. The winsorized effective tax rates from accounting standards also obtain identical values for quartiles. In both types of effective tax rates, tax rates of companies in the top quartile (75%) are close
to the top bracket of US Federal Tax Law, 35%.

In addition, in the lowest quartile (25%), interest to EBITDA ratio is only 2.55%, while it increases to 13.88% in the top quartile (75%) and reaches 31.39% for the top 5% group. Therefore, if we assume no change in financial structure and adjust the deduction limit to 30%, at least 5% of the companies are expected to be affected. Furthermore, if the deduction limit is down to 10%, more than 25% will be affected. In reality, when the deduction limit changes, companies alter their financial structure to change interest expenses. They are expected to decrease interest expenses in response to the adjusted limit. Therefore, under the assumption that financial structure does not change, one should be cautious not to overestimate the ratio of companies that will be affected.

As shown in the previous chapter, Action 4 final report of OECD/G20 suggests that it is appropriate to set the deduction limit within the range of interest to EBITDA ratio from 10% to 30%, if a government selects the earnings stripping rule from the thin capitalization rule. As the deduction limit decreases, more companies will be affected. When the limit decreases to 30%, at least more than 5% of the companies cannot obtain deductions for all interest expenses. If the limit falls to 10%, the percentage increases to at least 25%.

<table>
<thead>
<tr>
<th>Table III-2</th>
<th>Distribution of Major Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
<td>Obs</td>
</tr>
<tr>
<td>CashETR</td>
<td>4,444</td>
</tr>
<tr>
<td>CashETRW</td>
<td>4,444</td>
</tr>
<tr>
<td>GaapETR</td>
<td>4,444</td>
</tr>
<tr>
<td>GaapETRW</td>
<td>4,444</td>
</tr>
<tr>
<td>InterestEBITDA</td>
<td>4,154</td>
</tr>
<tr>
<td>DebtEquity</td>
<td>4,444</td>
</tr>
<tr>
<td>LiabEquity</td>
<td>4,444</td>
</tr>
<tr>
<td>Revenue</td>
<td>4,444</td>
</tr>
<tr>
<td>EBITDA</td>
<td>4,154</td>
</tr>
<tr>
<td>Asset</td>
<td>4,444</td>
</tr>
</tbody>
</table>
4 Analysis Results & Implications

A. Analysis Results

First of all, this section will show the actual relationship among winsorized cash effective tax rate (Winsorized Cash ETR) and interest to EBITDA ratio, debt-to-equity ratio, liability-to-equity ratio and dummy for exceeding liability limit. Revenue and total assets are added as control variables to the regression analysis of <Table III-3>.

<table>
<thead>
<tr>
<th>CashETRW</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>InterestEBITDA</td>
<td>-0.0073</td>
<td>-0.0066</td>
<td>-0.0072</td>
<td>-0.0003</td>
<td>0.0000</td>
</tr>
<tr>
<td>DebtEquity</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>LiabEquity</td>
<td>-1.0816*</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>ExcessLE</td>
<td>23.7829***</td>
<td>24.2536***</td>
<td>23.7904***</td>
<td>23.8251***</td>
<td>23.8381***</td>
</tr>
</tbody>
</table>

Note: Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
Regression analysis in <Table III-4> included ratio of property, plant and equipment to total assets, ratio of intangible assets and ratio of R&D costs as control variables. Unfortunately, many of the financial statements from Thomson Reuters Eikon omitted intangible assets or R&D cost items. Since we have excluded observations without those items, the number of observations for the regression analysis in <Table III-4> decreased to 1,350.

<table>
<thead>
<tr>
<th>(Table III-4) Analysis Result: Cash Effective Tax Rate, Interest Ratio &amp; Liability Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>CashETRW</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>InterestEBITDA</td>
</tr>
<tr>
<td>DebtEquity</td>
</tr>
<tr>
<td>LiabEquity</td>
</tr>
<tr>
<td>ExcessLE</td>
</tr>
<tr>
<td>Revenue</td>
</tr>
<tr>
<td>Asset</td>
</tr>
<tr>
<td>PPEAsset</td>
</tr>
<tr>
<td>IntangAsset</td>
</tr>
<tr>
<td>RnDAsset</td>
</tr>
<tr>
<td>Constant</td>
</tr>
<tr>
<td>Observations</td>
</tr>
<tr>
<td>R-squared</td>
</tr>
</tbody>
</table>

Note: Robust standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%
In <Table III-3>, each from (1) to (3) includes the ratio of interest costs, and (1) also includes the liability ratio and (2), dummy for exceeding liability limit among major independent variables. Meanwhile, (4) and (5) do not include the ratio of interest costs but debt ratio and liability ratio, respectively. Major independent variables in <Table III-4> are combined according to the identical order.

Hypothesis 1 expects that there is a negative relationship between the effective tax rate and interest to EBITDA ratio. If the coefficient of interest cost ratio variable (InterestEBITDA) is estimated to be negative, the hypothesis will obtain a reasonable ground. In Hypothesis 2, although it is generally difficult to forejudge the relationship between the effective tax rate and dummy for exceeding liability limit, the effective tax rate is expected to decrease when most companies originally paid its interest expenses within the deduction limit and decided to exceed the limit. If the coefficient of dummy for exceeding liability limit variable (ExcessLE) is estimated to be negative, such outlook will be supported.

First of all, from (1) to (3) in <Table III-3> show that the coefficient of ratio of interest cost variable (InterestEBITDA) is estimated to be negative. However, the estimate was not statistically significant. Although the sign conforms with our original estimation, it is not statistically significant enough to support Hypothesis 1. Meanwhile, from (1) to (3) in <Table III-4>, in which additional control variables, such as intangible assets and R&D expenses, were considered, show that not only the coefficient of interest cost ratio variable (InterestEBITDA) is estimated to be negative, but also it is statistically significant (1%). Recent studies have shown that multinational corporations with high intangible asset ratio or R&D expense ratio tend to be more involved in tax avoidance, and the result in <Table III-4> supports that they can avoid taxes by using the interest deduction system.

In addition, (2) of <Table III-3> shows that the coefficient of dummy for exceeding liability limit is estimated to be negative with statistical significance (10%). On the other hand, (2) of <Table III-4> shows an opposite sign for the coefficient estimate of dummy for exceeding liability limit without statistical significance. Such conflicting results may support the position that the relationship between the effective tax rate and dummy for exceeding liability
limit is generally unclear, as Hypothesis 2 suggests.

Interestingly, <Table III-4> shows that the effective tax rate has a positive relationship with the intangible asset ratio, and a negative relationship with the R&D cost ratio. Statistical significance is strong in both result (1%). It is probably because companies with a higher intangible asset ratio would be more likely to license income from overseas, which would increase taxable income in the US where tax rates are relatively high, and pay more taxes internationally. In addition, for company’s with a higher R&D cost ratio, the R&D costs are recognized as expenses, and therefore taxable income decreases, which lessens their tax burden.

( Table III-5) Analysis Result: Effective Tax Rate from Accounting Standards, Interest Ratio & Liability Ratio

<table>
<thead>
<tr>
<th>GaapETRW</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>InterestEBITDA</td>
<td>−0.0105 (0.0066)</td>
<td>−0.0106 (0.0068)</td>
<td>−0.0103 (0.0067)</td>
<td>0.0005*** (0.0002)</td>
<td></td>
</tr>
<tr>
<td>DebtEquity</td>
<td>0.0002*** (0.0001)</td>
<td>0.0002*** (0.0001)</td>
<td>0.0002*** (0.0001)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LiabEquity</td>
<td>0.6571 (0.4612)</td>
<td>0.0000*** (0.0000)</td>
<td>0.0000*** (0.0000)</td>
<td>0.0000*** (0.0000)</td>
<td>0.0000*** (0.0000)</td>
</tr>
<tr>
<td>ExcessLE</td>
<td>0.0000*** (0.0000)</td>
<td>0.0000*** (0.0000)</td>
<td>0.0000*** (0.0000)</td>
<td>0.0000*** (0.0000)</td>
<td>0.0000*** (0.0000)</td>
</tr>
<tr>
<td>Revenue</td>
<td>0.0000*** (0.0000)</td>
<td>0.0000*** (0.0000)</td>
<td>0.0000*** (0.0000)</td>
<td>0.0000*** (0.0000)</td>
<td>0.0000*** (0.0000)</td>
</tr>
<tr>
<td>Asset</td>
<td>−0.0000*** (0.0000)</td>
<td>−0.0000*** (0.0000)</td>
<td>−0.0000*** (0.0000)</td>
<td>−0.0000*** (0.0000)</td>
<td>−0.0000*** (0.0000)</td>
</tr>
<tr>
<td>Constant</td>
<td>27.6857*** (0.2621)</td>
<td>27.4345*** (0.3249)</td>
<td>27.7159*** (0.2615)</td>
<td>27.6203*** (0.2483)</td>
<td>27.6197*** (0.2485)</td>
</tr>
<tr>
<td>Observations</td>
<td>4154</td>
<td>4154</td>
<td>4154</td>
<td>4444</td>
<td>4444</td>
</tr>
<tr>
<td>R−squared</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Note: Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
Furthermore, we will examine the relationship between winsorized effective tax rate from accounting standards (Winsorized GAAP ETR) and interest to EBITDA ratio, debt-to-equity ratio, liability-to-equity ratio or dummy for exceeding liability limit.

<table>
<thead>
<tr>
<th>Table III-6</th>
<th>Analysis Result: Effective Tax Rate from Accounting Standards, Interest Ratio &amp; Liability Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>InterestEBITDA</td>
<td>$-0.0116^{***}$</td>
</tr>
<tr>
<td>DebtEquity</td>
<td></td>
</tr>
<tr>
<td>LiabEquity</td>
<td>$-0.0002$</td>
</tr>
<tr>
<td>ExcessLE</td>
<td></td>
</tr>
<tr>
<td>Revenue</td>
<td>$0.0000$</td>
</tr>
<tr>
<td>Asset</td>
<td>$-0.0000^*$</td>
</tr>
<tr>
<td>PPE Asset</td>
<td>$-0.0184$</td>
</tr>
<tr>
<td>Intang Asset</td>
<td>$-0.2000^{***}$</td>
</tr>
<tr>
<td>RnDA Asset</td>
<td>$-0.4705^{***}$</td>
</tr>
<tr>
<td>Observations</td>
<td>1352</td>
</tr>
<tr>
<td>R–squared</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Note: Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%
<Table III-5> considers revenue and total assets as control variables and <Table III-6> adds the ratio of property, plant and equipment, ratio of intangible assets and ratio of R&D costs to <Table III-5>. After excluding the data without intangible assets or R&D cost items, the final number of observations in <Table III-6> decreased to about 1,350.

In <Table III-5>, each entry from (1) to (3) includes the ratio of interest costs, and (1) also includes liability ratio and (2), dummy for exceeding liability limit among major independent variables. Meanwhile, (4) and (5) do not include the ratio of interest costs but debt ratio and liability ratio, respectively. Major independent variables in <Table III-6> are combined according to the identical order.

As shown in <Table III-5> and <Table III-6>, major independent variables have similar influence on the effective tax rate from accounting standards as they do on the cash effective tax rate. That is, the coefficient of interest cost ratio variable is estimated to be negative. In addition, when intangible asset and R&D cost ratios are considered as control variables (that is, for companies actively involved in related activities – active enough to include theses variables), a negative coefficient shows statistical significance (1%).

Therefore, we can conclude that the effective tax rate from accounting standards also tends to decrease as interest to EBITDA ratio of multinational corporation increases. Such tendency is especially true when the intangible asset ratio and R&D cost ratio are controlled (or for companies with active involvement in intangible asset management or R&D activities – active enough to report related items). Therefore, there is empirical evidence for Hypothesis 1 even considering the effective tax rate from accounting standards.

However, if we compare (2) of <Table III-5> and <Table III-6>, the coefficient of dummy for exceeding liability limit is estimated to show the opposite results according to the combination of control variables. It is found that both cases are statistically insignificant. Such result supports Hypothesis 2 that the relationship between dummy for exceeding liability limit (whether it satisfies Safe Harbor Rule) and effective tax rate is unclear.

One interesting fact is that as shown in <Table III-6>, the effective tax rate from accounting standards and intangible asset ratio show a statistically significant negative relationship. It is contrary to the result in <Table III-4>
where the cash effective tax rate and intangible asset ratio show statistically significant positive relationship.

B. Implications

We have analyzed the actual relationship between financial structures of major US multinational corporations and their effective tax rates. We confirmed that most of our observations (98%) pay their interest below 50% of EBITDA, which is within the deduction limit. Meanwhile, 5% of companies show an interest to EBITDA ratio that is higher than 30%, and 25% of them had the ratio of higher than 10%.

As Hypothesis 1 expected, actual analysis results show that when interest to EBITDA ratio of a multinational corporation increases, the effective tax rate will decrease. In both cases of the cash effective tax rate and effective tax rate from accounting standards, the effective tax rate tends to decrease as interest cost ratio increases. Furthermore, when we control the ratio of intangible asset or R&D costs of multinational corporations, such tendency shows a high statistical significance.

Meanwhile, Hypothesis 2 expected that the relationship between the compliance of Safe Harbor Rule and effective tax rate is unclear, but if most multinational corporations pay interest cost not to exceed the deduction limit, two variables will have a negative relationship.

Analysis showed that it is difficult to clarify the relationship between two variables, which only limitedly showed negative relationship. Not only compliance with the Safe Harbor Rule, but also debt (liability) to equity ratio of US-based multinational corporations generally showed an unclear relationship with the effective tax rate.

Tax strategy to reduce the tax burden internationally through debt contract between affiliates is possible because there is a difference in corporate income tax rates in each residing country of the affiliates. In addition, reduction of the tax burden by paying interest to affiliates with a lower tax rate is determined by the extent of difference between tax rates. Therefore, not only for US-based affiliates (headquarters) but also for an affiliate in another country, if the country has a higher corporate income tax rate than that of other countries, the corporation
can reduce the tax burden internationally by debt contract between affiliates. For example, a multinational corporation has an affiliate in Korea and in a country with a lower tax rate, it can reduce total tax expense by paying interest from the Korean affiliate to the affiliate with the lower tax rate. Therefore, if we do not separate Korean-based affiliates of multinational corporations, it is still meaningful to understand the general tax strategy through debt contract between affiliates.

Lastly, it should be noted that financial data used for this analysis may underestimate the actual size of interest expenses and liabilities. It is because that an auditor may offset the interest expenses and debt between affiliates when composing consolidated financial statements. Despite such possibility, it is surprising that interest expenses and effective tax rates still show a statistically significant relationship.

In principle, we need to obtain financial statements of each affiliate to minimize the possibility of such underestimation. However, most affiliates are not listed or limited-liability companies, so it is realistically difficult to collect their financial data. Furthermore, it may be very complicated to determine whether a company is an affiliate of a corporation.
Conclusion

Korea’s thin capitalization rule limits the debt to equity investment ratio and does not recognize an interest payment exceeding such limit as an expense but considers it as a dividend to pay taxes. Since the limit is relatively low and exceeding interest is considered as a dividend, it can be said that Korea has a significantly strong thin capitalization rule. However, such finding deviates from recent discussions by international organizations, such as the OECD.

Major countries’ thin capitalization rules consider interest to income (EBITDA; Earnings Before Interest, Tax, Depreciation and Amortization) ratio as the deduction limit. Furthermore, OECD BEPS protection project also suggests the interest cost to EBITDA ratio as a standard.

The United States introduced the earnings stripping rule in 1986 to limit the interest deduction. For companies with a liability to equity ratio below 150% (that is, compliant with the “Safe Harbor Rule”), there is no limit for interest deduction. For those with liability to equity ratio over 150%, interest payment below 50% of EBITDA can be recognized as expenses to be deducted, but exceeding interest expenses are not allowed to be deducted.

Germany adopted the earnings stripping rule in 2008. No limit is applied to interest deduction if a German-based affiliate of a multinational corporation maintains its debt ratio below the group’s average (adding 2%p to the average debt ratio of the group) and its interest payment to related parties remains below 10% of EBITDA. If it does not satisfy these two conditions, interest payment up to 30% of EBITDA can be deducted, but otherwise, no deduction can be applied.
Japan considers both debt to equity investment ratio and interest to EBITDA ratio as standards. Before 2013, it only adopted the debt to equity investment ratio, and has added interest to EBITDA ratio since 2013 to determine the deduction limit. Specifically, it compares the exceeding interest payment of debt to equity investment ratio over 3x and interest to EBITDA ratio over 50% and limits interest deduction for the bigger amount of the two.

When the interest deduction systems of Korea are compared with those of major countries, they are classified into two categories by standards: ones with debt-to-equity investment ratio and others with an interest to EBITDA ratio as standards. The category can also be segmented by limiting the borrowing and interest payment to those for related parties. The system may differ significantly according to the level of each limit.

Since countries have different interest deduction standards, it is necessary to examine an actual relationship between each standard and the effective tax rate of multinational corporations. Our analysis is based on financial statements of major US-based multinational companies (S&P 500 companies), extracted from Thomson Reuters Eikon. We have analyzed the relationship between liability (debt) ratio, interest cost ratio and effective tax rate.

Most US-based multinational corporations for our analysis (98%) pay interest expenses within the deduction limit, 50% of EBITDA. Companies with interest expenses exceeding 30% had interest to EBITDA ratios of about 5%, and the interest payments of at least 25% of them exceeded 10% interest to EBITDA ratios.

Before actual analysis, we have estimated that the effective tax rate will decrease if interest to EBITDA ratio of a multinational corporation increases, and our results generally supported the hypothesis. We found that the effective tax rate tends to decrease when the ratio of interest costs increase for both cases where cash effective tax rate and effective tax rate from accounting standards are used as a standard. Furthermore, when we control intangible assets and R&D cost ratio of a multinational corporation, such tendency gains more statistical significance.

In addition, generally, compliance with the Safe Harbor Rule and effective tax rate do not show a clear relationship. However, if most multinational corporations do not exceed the deduction limit, two named variables are expected
to have a negative relationship. This study could not show the certain conclusion between two variables, but only showed a limited negative relationship. Simple compliance with the Safe Harbor Rule as well as debt (liability)-to-equity ratio of US-based multinational corporations generally showed an unclear relationship with the effective tax rate.

In conclusion, implications for Korea’s thin capitalization rule are as follows.

First of all, it seems necessary to review the transition from the current system with debt to equity investment ratio to interest to EBITDA ratio. Major countries including the US, Germany and Japan have already adopted interest to EBITDA ratio as the standard for interest deduction system. Furthermore, BEPS Action 4 final report of OECD/G20 on counteractive measures against abuse of interest deduction also suggests the interest to EBITDA ratio. Empirical analysis using financial statements of major US-based multinational corporations also showed that there is a negative relationship between their effective tax rate and interest to EBITDA ratio.

If one wants to minimize the confusion over business management or additional tax burden due to systematic transfer, he or she can refer to the Safe Harbor Rule of the US thin capitalization rule and consider the additional standard of interest to EBITDA ratio with maintaining current rule as if it is the Safe Harbor Rule. It will allow all affiliates of multinational corporations residing in Korea, currently obtaining full interest deduction (with debt to equity investment ratio below 2x), to maintain their benefit without any additional tax burden due to systematic transfer. For affiliates with their debt ratio over 2x, interest to EBITDA ratio will be applied. If their interest to EBITDA ratio is within the limit, they now will receive full deduction for their interest expenses; if not, their interest expenses will not be deducted. In this manner, only those with debt to equity investment ratio over 2x and interest to EBITDA ratio over a certain limit cannot receive deduction for all their interest expenses. Although the list of companies will be determined by the specific limit for interest to EBITDA ratio, usually not many companies are expected to be excluded from such benefit. As shown in the example of US-based multinational corporations, only 5% exceeded 30% for their interest to EBITDA ratio.

It may be difficult to collect data to review the transition of interest
deduction system. However, further study should collect the financial data of affiliates of multinational companies residing in Korea, and analyze the effect of the transition according to the detailed level of interest to EBITDA ratio limit.

Under the international discussion to improve the interest deduction system, this study obtains the significance to open a discussion for Korea’s interest deduction system. There still are additional topics to be discussed. We hope that further studies will be performed in response to the international flow to design and operate an appropriate interest deduction system in Korea.
Bibliography

Ana Paula Dourado & Rita de la Feria, Thin capitalization rules in the context of the CCCTB, Oxford University Centre for Business Taxation, 2008

Bruno Gouthiere, A Comparative Study of the Thin Capitalization Rules in the Member States of the European Union and Certain Other States, EUROPEAN TAXATION, September-October 2005


Ernst&Young, 2012 Japan tax reform proposals introduce earnings stripping rules, 2011. 12

EUROPEAN TAXATION, Comments on ECJ, Lankhorst-Hohorst GmbH, Case C-324/00, 12 December 2002, May 2003


IBFD, www.ibfd.org, Search date: 2016. 7. 18


PwC, Worldwide Tax Summaries Corporate Taxes, 2015/16
The Japan Tax Site, www.japantax.org, Search date: 2016. 7. 20
Yoshihito Ueno, Japan’s Proposed Earnings Stripping Rules, tax analysts, 2012. 1. 23